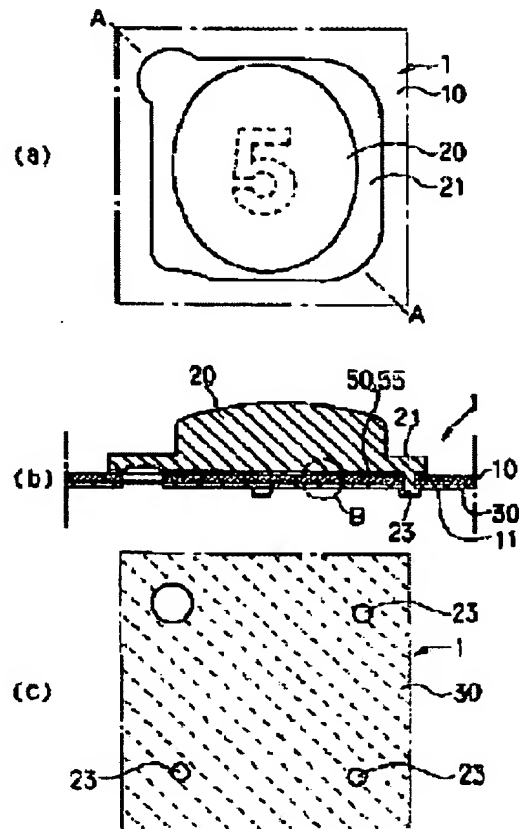


ILLUMINATING MECHANISM FOR RESIN MOLD ELECTRONIC EQUIPMENT**Publication number:** JP10188718**Publication date:** 1998-07-21**Inventor:** NAITO SHUNJI; OKAMURA TATSUYA; HAGIMURA MASAYUKI**Applicant:** TEIKOKU TSUSHIN KOGYO KK**Classification:****- international:** H01H13/02; H01H13/02; (IPC1-7): H01H13/02**- european:****Application number:** JP19960357334 19961226**Priority number(s):** JP19960357334 19961226

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Abstract of JP10188718

PROBLEM TO BE SOLVED: To provide an illuminating mechanism for a resin mold electronic equipment, having a simple structure and capable of easily and uniformly illuminating the entire resin molding for electronic equipment. **SOLUTION:** An electroluminescent element layer 30 is formed on one side of a transparent or translucent synthetic-resin sheet 10. A transparent or translucent molten molding resin is directly molded on the opposite side of the synthetic resin sheet 10 to the part where the electroluminescent element layer 30 has been formed, thereby mounting a transparent or translucent key top (resin molding for electronic equipment) 20 on the synthetic resin sheet 10.



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CLAIMS

[Claim(s)]

[Claim 1] The illumination device of the mold resin object for electronic equipment characterized by attaching transparence or the translucent mold resin object for electronic equipment on this synthetic-resin sheet by casting transparence or translucent melting mold resin directly on the field of the opposite side of the part which formed the electroluminescent element layer in the front face of transparence or a translucent synthetic-resin sheet, and formed the electroluminescent element layer of this synthetic-resin sheet.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the illumination device of the suitable mold resin object for electronic equipment to illuminate mold resin objects for electronic equipment, such as a keytop.

[0002]

[Description of the Prior Art] When the keytop used for a push button switch was illuminated conventionally, light emitting diode was attached on the substrate and the transparent keytop has been arranged in the upper part of this light emitting diode, and it constituted so that the light discharged from said light emitting diode might be drawn in said keytop and this keytop might be illuminated from the inferior-surface-of-tongue side.

[0003]

[Problem(s) to be Solved by the Invention] However, there were the following troubles in the above-mentioned conventional illumination device. ** Since light emitting diode became the point light source, it was difficult to illuminate to homogeneity the whole front face of a keytop which it is going to illuminate. Moreover, although it is necessary to attach separately the diffusion member which diffuses the light source in order to cancel this fault, the problem of the structure of equipment being complicated if it does so, and an assembly activity becoming complicated, and thickness becoming thick further will arise.

[0004] ** Although many keytops are usually arranged on a substrate, it will have to stop also having to arrange many number of light emitting diodes in that case.

[0005] ** Power consumption of light emitting diode is large, and when it applies to the portable equipment using especially a cell, it becomes impossible to disregard the effect to continuous duty time amount.

[0006] This invention is made in view of an above-mentioned point, and the purpose has structure in offering the illumination device of the mold resin object for electronic equipment which can be easy and can illuminate the whole mold resin object for electronic equipment to homogeneity easily.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned trouble, this invention was constituted by casting transparence or translucent melting mold resin directly on the field of the opposite side of the part which formed the electroluminescent element layer in the front face of transparence or a translucent synthetic-resin sheet, and formed the electroluminescent element layer of this synthetic-resin sheet so that transparence or the translucent mold resin object for electronic equipment might be attached on this synthetic-resin sheet.

[0008]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail based on a drawing. Drawing 1 is drawing showing the important section of the keytop plate 1 which used this invention, and this drawing (a) is [the A-A sectional view of this drawing (a) and this drawing (c) of a top view and this drawing (b)] rear-face Figs. Moreover, drawing 2 is the enlarged drawing of B part of drawing 1 (a). In addition, the thickness of each class printed on the synthetic-resin sheet 10 in drawing 1 thru/or drawing 5 is shown actually more quite respectively thickly on account of explanation.

[0009] As shown in drawing 1, this keytop plate 1 forms the electroluminescent element layer 30 in one field (rear face) of the synthetic-resin sheet 10, forms a printing layer and glue lines 50 and 55 in the field (front face) of another side, and a keytop 20 is cast and it is constituted so that a this printing layer and glue line 50 and 55 top may be covered. In addition, on the synthetic-resin sheet 10 of one sheet, many above-mentioned keytops 20 are cast in practice. Each component is explained to a detail below.

[0010] First, as shown in drawing 2, the electroluminescent element layer 30 carries out the laminating of the transparent electrode layer 31 which becomes the whole abbreviation for one field (rear face) of the synthetic-resin sheet 10 from the transparence electric conduction film, the emitter layer 33, an insulating layer 35, the back plate layer 37, and the insulating protective layer 39 to this sequence, and is constituted.

[0011] As a synthetic-resin sheet 10, the transparent film made from polyethylene terephthalate with a thickness of about 100 micrometers is used here, for example.

[0012] As a transparent electrode layer 31, the ITO film (indium-tin-oxide film) with a thickness of about 1 micrometer is used, for example.

[0013] As an illuminant layer 33, the thickness is set to about 50 micrometers using what mixed the powder of a fluorescent substance (for example, thing which doped Cu to ZnS) in resin binders (high dielectric constant resin, for example, cyano ethyl system resin, polyvinylidene fluoride system resin, etc.).

[0014] As an insulating layer 35, what mixed the high dielectric constant filler (for example, powder of barium titanate) is used for a high dielectric constant insulating material (for example, cyano ethyl system resin, polyvinylidene fluoride system resin, etc.), for example, high dielectric constant resin.

[0015] As a back plate layer 37, carbon paste and a silver paste are used, for example.

[0016] Next, the printing layer 50 of desired configuration and color is formed in the part which forms the keytop 20 of the field (front face) of another side of the synthetic-resin sheet 10, and the transparent glue line 55 made of vinyl chloride resin is formed in the

whole field where a keytop 20 contacts on it at it. And the keytop 20 has pasted up on the glue line 55.

[0017] It returns to drawing 1 , and he forms three fixed parts 23 in the opposite side (rear face) side of the synthetic-resin sheet 10 through three through tubes 11 which the keytop 20 consisted of a thermoplastic transparent mold resin ingredient, formed the flange section 21 in the periphery, and were prepared in the inferior surface of tongue of this flange section 21 at the synthetic-resin sheet 10, and is trying for these fixed parts 23 and the flange section 21 to pinch the synthetic-resin sheet 10.

[0018] In addition, since the keytop 20 is fixed by the fixed part 23 and the flange section 21 with this operation gestalt, a glue line 55 is necessarily unnecessary.

[0019] Next, the manufacture approach of this keytop plate 1 is explained using drawing 3 . As first shown in drawing 3 (a), the electroluminescent element layer 30 is formed in one whole field of this synthetic-resin sheet 10 by carrying out printing formation of the emitter layer 33, an insulating layer 35, the back plate layer 37, and the insulating protective layer 39 in this sequence on this transparent electrode layer 31 of the synthetic-resin sheet 10 which forms the transparent electrode layer 31 in one whole field (rear face), and becomes.

[0020] Next, as shown in drawing 3 (a), the printing layer 50 of a predetermined configuration is printed in the predetermined location of the field (front face) of the opposite side of the synthetic-resin sheet 10, and the transparent glue line 55 is printed on it in it.

[0021] Next, as shown in drawing 3 (b), opening of three through tubes 11 and the one through tube 13 for pin gates is carried out to this synthetic-resin sheet 10 with a press.

[0022] Next, as shown in drawing 3 (c), the 1st and 2nd metal mold 60 and 70 is prepared. The mold cavity 61 of the same configuration as the up configuration of a keytop 20 is formed in the 1st metal mold 60, and three mold cavities 71 and pin gates 73 of the same configuration as a fixed part 23 are established in the 2nd metal mold 70.

[0023] And if said synthetic-resin sheet 10 is pinched between the 1st and 2nd metal mold 60 and 70, a pin gate 73 will penetrate the through tube 13 for pin gates of the synthetic-resin sheet 10.

[0024] And while pressing fit the resin fused from the pin gate 73 and filling the inside of a mold cavity 61 with melting resin, melting resin is filled also in a mold cavity 71 through a through tube 11.

[0025] And if the 1st and 2nd metal mold 60 and 70 is removed after said melting resin solidifies, molding of the keytop 20 shown in drawing 1 will be completed, and the keytop plate 1 will be completed.

[0026] Drawing 4 is the outline sectional side elevation showing one example of the push button switch constituted using the above-mentioned keytop plate 1. As shown in this drawing, this push button switch arranges the switch substrate 80 to the keytop plate 1 down side, attaches the click plate 83 on the switch contact 81 prepared in this switch substrate 80, and it constitutes it so that one fixed part 23 of said keytop 20 may be arranged on this click plate 83.

[0027] And if a keytop 20 is pressed, a keytop 20 descends, and the fixed part 23 reverses the click plate 83, and turns on a switch contact 81.

[0028] On the other hand, between the transparent electrode layer 31 of said electroluminescent element layer 30, and the back plate layer 37 (refer to drawing 2), if the alternating voltage of 1kHz is impressed by 100V, the emitter layer 33 whole will emit light and the light will be emitted from the front face of this keytop 20 through the transparent synthetic-resin sheet 10 and a transparent keytop 20. A pattern that it was printed by the printing layer 50 at this time etc. begins to be brightly compared with the front face of a keytop 20.

[0029] Since the electroluminescent element layer 30 shines the keytop 20 whole to homogeneity, there is little strength of the intensity of light in each part of a keytop 20, and the bias of light like [at the time of using light emitting diode] is not produced at all.

[0030] Drawing 5 (a) and (b) are the outline sectional side elevations showing keytop plate 1' and other push button switches constituted using 1."

[0031] In the push button switch shown in drawing 5 (a), the points which are different from the push button switch shown in drawing 4 are only the point (the keytop 20 is being fixed by the glue line 55 [refer to drawing 2]) of having omitted the fixed part 23, keytop plate 1' and the point which inserted the rubber sheet 85 between the switch substrates 80, and a point that carried out the location of a switch contact 81 and the click plate 83 just under the keytop 20.

[0032] Thus, if the flexible rubber sheet 85 is made to intervene, even if it locates a switch contact 81 in right under [of a keytop 20 / central] and presses this, it will not mourn over the electroluminescent element layer 3.

[0033] in addition -- this invention -- starting -- a keytop -- a plate -- the above -- structure -- a thing -- limiting -- not having -- for example, -- drawing 5 -- (-- b --) -- being shown -- a keytop -- a plate -- one -- " -- like -- a keytop -- 20 -- an inferior surface of tongue -- a center -- synthetic resin -- a sheet -- ten -- penetrating -- pinching -- a fixed part -- 23 -- you may prepare -- etc. -- versatility -- deformation -- being possible .

[0034] Furthermore, it this invention is not only applied to the keytop plate 1, but is applicable to illumination of other various mold resin objects for electronic equipment, such as a part of the tongue of for example, rotating type electronic parts, and a part of the tongue of a slide type variable resistor.

[0035]

[Effect of the Invention] As explained to the detail above, according to this invention, it has the following outstanding effectiveness.

** Since the electroluminescent element layer is used, even if it can make the light source into a plane and does not use a diffusion member etc. separately, the whole front face of a keytop can be easily illuminated to homogeneity.

[0036] ** The light source is a plane, and since it is thin, thin shape-ization of equipment can be attained.

[0037] ** Since many mold resin objects can be illuminated by forming an electroluminescent element layer in the whole synthetic-resin sheet of one sheet at once, it is not necessary to attach much light emitting diodes like before, and structure is easy, components mark can be reduced, and an assembly is easy.

[0038] ** There is little power consumption compared with the thing using light emitting diode (abbreviation one half). When it applies to the pocket device using especially a cell, it is effective for extension of continuous duty time amount.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the illumination device of the suitable mold resin object for electronic equipment to illuminate mold resin objects for electronic equipment, such as a keytop.

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PRIOR ART

[Description of the Prior Art] When the keytop used for a push button switch was illuminated conventionally, light emitting diode was attached on the substrate and the transparent keytop has been arranged in the upper part of this light emitting diode, and it constituted so that the light discharged from said light emitting diode might be drawn in said keytop and this keytop might be illuminated from the inferior-surface-of-tongue side.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained to the detail above, according to this invention, it has the following outstanding effectiveness.
** Since the electroluminescent element layer is used, even if it can make the light source into a plane and does not use a diffusion member etc. separately, the whole front face of a keytop can be easily illuminated to homogeneity.

[0036] ** The light source is a plane, and since it is thin, thin shape-ization of equipment can be attained.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there were the following troubles in the above-mentioned conventional illumination device. ** Since light emitting diode became the point light source, it was difficult to illuminate to homogeneity the whole front face of a keytop which it is going to illuminate. Moreover, although it is necessary to attach separately the diffusion member which diffuses the light source in order to cancel this fault, the problem of the structure of equipment being complicated if it does so, and an assembly activity becoming complicated, and thickness becoming thick further will arise.

[0004] ** Although many keytops are usually arranged on a substrate, it will have to stop also having to arrange many number of light emitting diodes in that case.

[0005] ** Power consumption of light emitting diode is large, and when it applies to the portable equipment using especially a cell, it becomes impossible to disregard the effect to continuous duty time amount.

[0006] This invention is made in view of an above-mentioned point, and the purpose has structure in offering the illumination device of the mold resin object for electronic equipment which can be easy and can illuminate the whole mold resin object for electronic equipment to homogeneity easily.

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned trouble, this invention was constituted by casting transparency or translucent melting mold resin directly on the field of the opposite side of the part which formed the electroluminescent element layer in the front face of transparency or a translucent synthetic-resin sheet, and formed the electroluminescent element layer of this synthetic-resin sheet so that transparency or the translucent mold resin object for electronic equipment might be attached on this synthetic-resin sheet.

[0008]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail based on a drawing. Drawing 1 is drawing showing the important section of the keytop plate 1 which used this invention, and this drawing (a) is [the A-A sectional view of this drawing (a) and this drawing (c) of a top view and this drawing (b)] rear-face Figs. Moreover, drawing 2 is the enlarged drawing of B part of drawing 1 (a). In addition, the thickness of each class printed on the synthetic-resin sheet 10 in drawing 1 thru/or drawing 5 is shown actually more quite respectively thickly on account of explanation.

[0009] As shown in drawing 1, this keytop plate 1 forms the electroluminescent element layer 30 in one field (rear face) of the synthetic-resin sheet 10, forms a printing layer and glue lines 50 and 55 in the field (front face) of another side, and a keytop 20 is cast and it is constituted so that a this printing layer and glue line 50 and 55 top may be covered. In addition, on the synthetic-resin sheet 10 of one sheet, many above-mentioned keytops 20 are cast in practice. Each component is explained to a detail below.

[0010] First, as shown in drawing 2, the electroluminescent element layer 30 carries out the laminating of the transparent electrode layer 31 which becomes the whole abbreviation for one field (rear face) of the synthetic-resin sheet 10 from the transparency electric conduction film, the emitter layer 33, an insulating layer 35, the back plate layer 37, and the insulating protective layer 39 to this sequence, and is constituted.

[0011] As a synthetic-resin sheet 10, the transparent film made from polyethylene terephthalate with a thickness of about 100 micrometers is used here, for example.

[0012] As a transparent electrode layer 31, the ITO film (indium-tin-oxide film) with a thickness of about 1 micrometer is used, for example.

[0013] As an illuminant layer 33, the thickness is set to about 50 micrometers using what mixed the powder of a fluorescent substance (for example, thing which doped Cu to ZnS) in resin binders (high dielectric constant resin, for example, cyano ethyl system resin, polyvinylidene fluoride system resin, etc.).

[0014] As an insulating layer 35, what mixed the high dielectric constant filler (for example, powder of barium titanate) is used for a high dielectric constant insulating material (for example, cyano ethyl system resin, polyvinylidene fluoride system resin, etc.), for example, high dielectric constant resin.

[0015] As a back plate layer 37, carbon paste and a silver paste are used, for example.

[0016] Next, the printing layer 50 of desired configuration and color is formed in the part which forms the keytop 20 of the field (front face) of another side of the synthetic-resin sheet 10, and the transparent glue line 55 made of vinyl chloride resin is formed in the whole field where a keytop 20 contacts on it at it. And the keytop 20 has pasted up on the glue line 55.

[0017] It returns to drawing 1, and he forms three fixed parts 23 in the opposite side (rear face) side of the synthetic-resin sheet 10 through three through tubes 11 which the keytop 20 consisted of a thermoplastic transparent mold resin ingredient, formed the flange section 21 in the periphery, and were prepared in the inferior surface of tongue of this flange section 21 at the synthetic-resin sheet 10, and is trying for these fixed parts 23 and the flange section 21 to pinch the synthetic-resin sheet 10.

[0018] In addition, since the keytop 20 is fixed by the fixed part 23 and the flange section 21 with this operation gestalt, a glue line 55 is necessarily unnecessary.

[0019] Next, the manufacture approach of this keytop plate 1 is explained using drawing 3. As first shown in drawing 3 (a), the electroluminescent element layer 30 is formed in one whole field of this synthetic-resin sheet 10 by carrying out printing formation of the emitter layer 33, an insulating layer 35, the back plate layer 37, and the insulating protective layer 39 in this sequence on this transparent electrode layer 31 of the synthetic-resin sheet 10 which forms the transparent electrode layer 31 in one whole field (rear face), and becomes.

[0020] Next, as shown in drawing 3 (a), the printing layer 50 of a predetermined configuration is printed in the predetermined location of the field (front face) of the opposite side of the synthetic-resin sheet 10, and the transparent glue line 55 is printed on it in it.

[0021] Next, as shown in drawing 3 (b), opening of three through tubes 11 and the one through tube 13 for pin gates is carried out to this synthetic-resin sheet 10 with a press.

[0022] Next, as shown in drawing 3 (c), the 1st and 2nd metal mold 60 and 70 is prepared. The mold cavity 61 of the same configuration as the up configuration of a keytop 20 is formed in the 1st metal mold 60, and three mold cavities 71 and pin gates 73 of the same configuration as a fixed part 23 are established in the 2nd metal mold 70.

[0023] And if said synthetic-resin sheet 10 is pinched between the 1st and 2nd metal mold 60 and 70, a pin gate 73 will penetrate the through tube 13 for pin gates of the synthetic-resin sheet 10.

[0024] And while pressing fit the resin fused from the pin gate 73 and filling the inside of a mold cavity 61 with melting resin, melting resin is filled also in a mold cavity 71 through a through tube 11.

[0025] And if the 1st and 2nd metal mold 60 and 70 is removed after said melting resin solidifies, molding of the keytop 20 shown in drawing 1 will be completed, and the keytop plate 1 will be completed.

[0026] Drawing 4 is the outline sectional side elevation showing one example of the push button switch constituted using the above-mentioned keytop plate 1. As shown in this drawing, this push button switch arranges the switch substrate 80 to the keytop plate 1 down side, attaches the click plate 83 on the switch contact 81 prepared in this switch substrate 80, and it constitutes it so that one fixed part 23 of said keytop 20 may be arranged on this click plate 83.

[0027] And if a keytop 20 is pressed, a keytop 20 descends, and the fixed part 23 reverses the click plate 83, and turns on a switch contact 81.

[0028] On the other hand, between the transparent electrode layer 31 of said electroluminescent element layer 30, and the back plate layer 37 (refer to drawing 2), if the alternating voltage of 1kHz is impressed by 100V, the emitter layer 33 whole will emit light and the light will be emitted from the front face of this keytop 20 through the transparent synthetic-resin sheet 10 and a transparent keytop 20. A pattern that it was printed by the printing layer 50 at this time etc. begins to be brightly compared with the front face of a keytop 20.

[0029] Since the electroluminescent element layer 30 shines the keytop 20 whole to homogeneity, there is little strength of the intensity of light in each part of a keytop 20, and the bias of light like [at the time of using light emitting diode] is not produced at all.

[0030] Drawing 5 (a) and (b) are the outline sectional side elevations showing keytop plate 1' and other push button switches constituted using 1."

[0031] In the push button switch shown in drawing 5 (a), the points which are different from the push button switch shown in drawing 4 are only the point (the keytop 20 is being fixed by the glue line 55 [refer to drawing 2]) of having omitted the fixed part 23, keytop plate 1' and the point which inserted the rubber sheet 85 between the switch substrates 80, and a point that carried out the location of a switch contact 81 and the click plate 83 just under the keytop 20.

[0032] Thus, if the flexible rubber sheet 85 is made to intervene, even if it locates a switch contact 81 in right under [of a keytop 20 / central] and presses this, it will not mourn over the electroluminescent element layer 3.

[0033] in addition — this invention — starting — a keytop — a plate — the above — structure — a thing — limiting — not having — for example, — drawing 5 — (— b —) — being shown — a keytop — a plate — one — " — like — a keytop — 20 — an inferior surface of tongue — a center — synthetic resin — a sheet — ten — penetrating — pinching — a fixed part — 23 — you may prepare — etc. — versatility — deformation — being possible .

[0034] Furthermore, it this invention is not only applied to the keytop plate 1, but is applicable to illumination of other various mold resin objects for electronic equipment, such as a part of the tongue of for example, rotating type electronic parts, and a part of the tongue of a slide type variable resistor.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the important section of the keytop plate 1 using this invention, and this drawing (a) is [the A-A sectional view of this drawing (a) and this drawing (c) of a top view and this drawing (b)] rear-face Figs.

[Drawing 2] It is the enlarged drawing of B part of drawing 1 (a).

[Drawing 3] It is drawing showing the manufacture approach of the keytop plate 1.

[Drawing 4] It is the outline sectional side elevation showing one example of the push button switch using the keytop plate 1.

[Drawing 5] Drawing 5 (a) and (b) are the outline sectional side elevations showing the keytop plate 1 and other push button switches which used 1'.

[Description of Notations]

10 Synthetic-Resin Sheet

20 Keytop (Mold Resin Object for Electronic Equipment)

30 Electroluminescent Element Layer

[Translation done.]

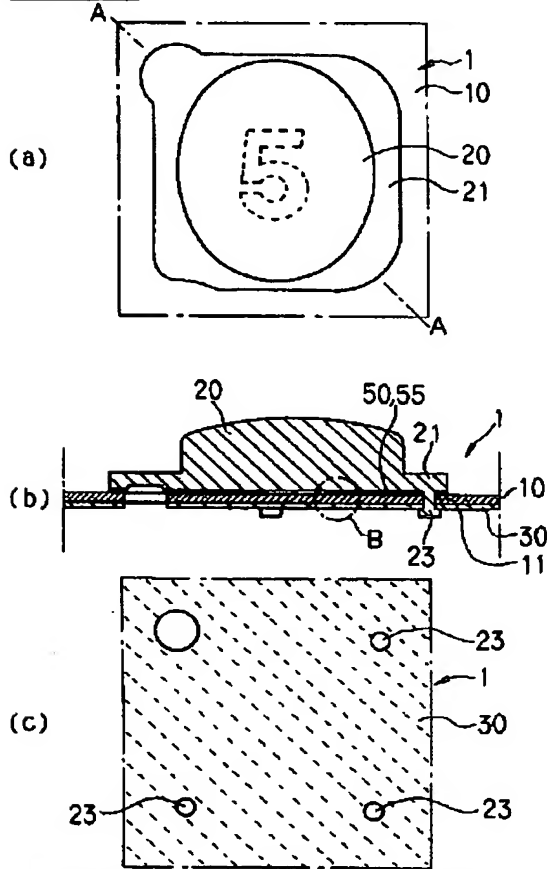
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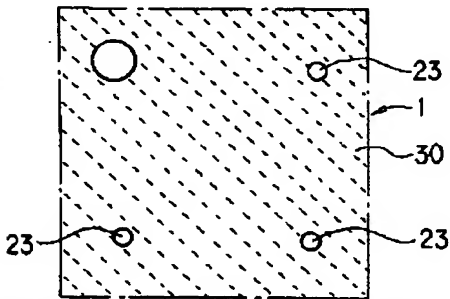
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DRAWINGS

[Drawing 1]

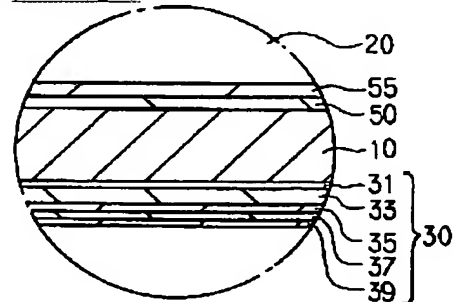


(c)



本発明を用いたキートップ板 1 の要部を示す図

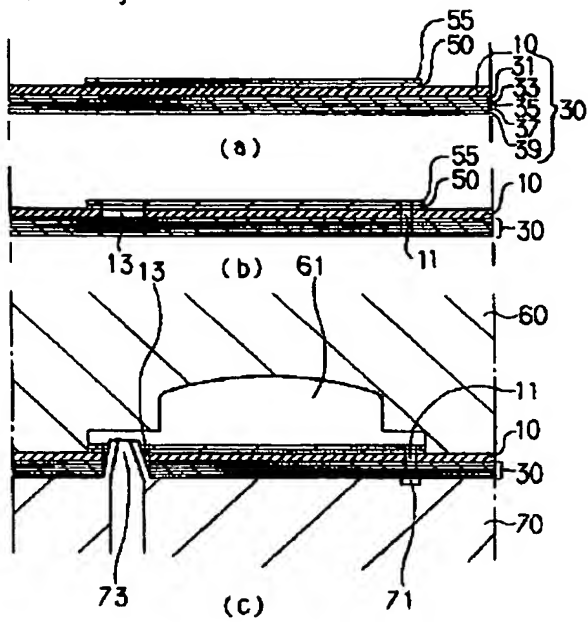
[Drawing 2]



10 合成樹脂シート 20 キートップ
30 エレゲトロルミネッセンス素子層

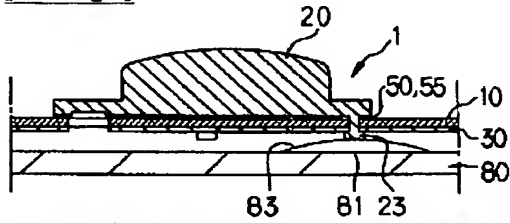
図 1 (a) の B 部分の拡大図

[Drawing 3]



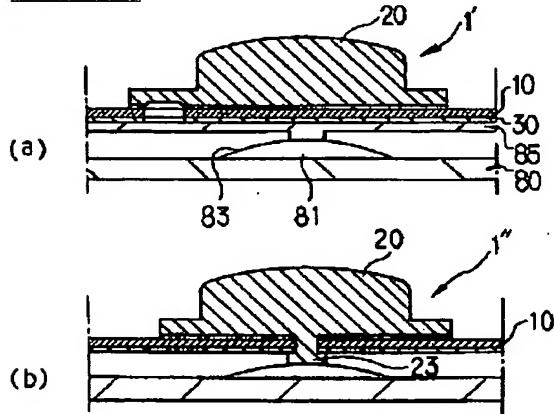
キートップ板 1 の製造方法を示す図

[Drawing 4]



キートップ板 1 を用いた押釦スイッチを示す図

[Drawing 5]



キートップ板 1 を用いた押釦スイッチを示す図

[Translation done.]

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(71) 出願人 000215833

帝国通信工業株式会社

神奈川県川崎市中原区荻宿335番地

(72) 発明者 内藤 俊司

神奈川県川崎市中原区荻宿335番地 帝国
通信工業株式会社内

(72) 発明者 岡村 達也

神奈川県川崎市中原区荻宿335番地 帝国
通信工業株式会社内

(72) 発明者 萩村 雅之

神奈川県川崎市中原区荻宿335番地 帝国
通信工業株式会社内

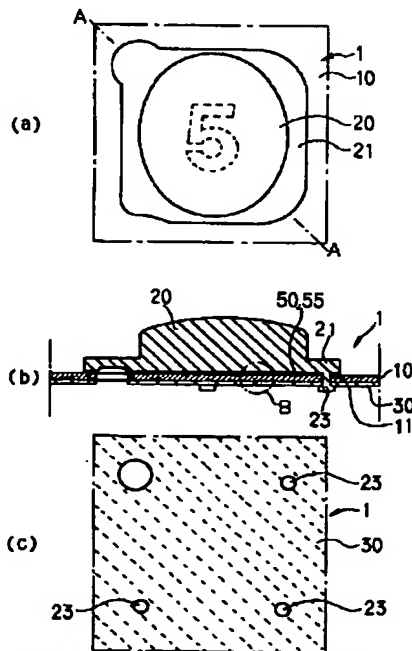
(74) 代理人 弁理士 熊谷 隆 (外1名)

(54) 【発明の名称】 電子機器用モールド樹脂体の照光機構

(57) 【要約】

【課題】 構造が簡単で容易に電子機器用モールド樹脂体全体を均一に照光できる電子機器用モールド樹脂体の照光機構を提供する。

【解決手段】 透明または半透明な合成樹脂シート10の一方の面にエレクトロルミネッセント素子層30を形成する。合成樹脂シート10のエレクトロルミネッセント素子層30を形成した部分の反対側の面上に透明又は半透明な溶融モールド樹脂を直接成型することによって合成樹脂シート10上に透明又は半透明なキートップ(電子機器用モールド樹脂体)20を取り付ける。



本発明を用いたキートップ板1の要部を示す図

【特許請求の範囲】

【請求項1】 透明または半透明な合成樹脂シート of the surface to form an electroluminescent element layer, and the surface of the electroluminescent element layer of the synthetic resin sheet to form a part of the opposite side of the surface to form a transparent or semi-transparent fused mold resin by direct molding, thereby forming a transparent or semi-transparent electronic device mold resin body on the surface of the transparent or semi-transparent electronic device mold resin body, thereby forming a lighting mechanism.

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はキートップ等の電子機器用モールド樹脂体を照光するのに好適な電子機器用モールド樹脂体の照光機構に関するものである。

【0002】

【従来の技術】従来、押釦スイッチに用いられるキートップを照光する場合は、基板上に発光ダイオードを取り付け、該発光ダイオードの上部に透明なキートップを配置し、前記発光ダイオードから発射された光を前記キートップ内に導いて該キートップをその下面側から照光するように構成していた。

【0003】

【発明が解決しようとする課題】しかしながら上記従来の照光機構には以下のような問題点があった。①発光ダイオードは点光源になるため、照光しようとするキートップの表面全体を均一に照光することは困難であった。またこの欠点を解消するためには、光源を拡散する拡散部材を別途取り付ける必要があるが、そうすると装置の構造が複雑化し、また組み立て作業が煩雑になり、さらに厚みが厚くなってしまふなどの問題が生じてしまう。

【0004】②キートップは通常基板上に多数個配置されるが、その場合発光ダイオードの数も多数個配置しなければならなくなってしまう。

【0005】③発光ダイオードは消費電力が大きく、特に電池を利用した携帯用機器に応用した場合は連続使用時間に対する影響が無視できなくなる。

【0006】本発明は上述の点に鑑みてなされたものでありその目的は、構造が簡単で容易に電子機器用モールド樹脂体全体を均一に照光できる電子機器用モールド樹脂体の照光機構を提供することにある。

【0007】

【課題を解決するための手段】上記問題点を解決するため本発明は、透明または半透明な合成樹脂シート of the surface to form an electroluminescent element layer, and the surface of the electroluminescent element layer of the synthetic resin sheet to form a part of the opposite side of the surface to form a transparent or semi-transparent fused mold resin by direct molding, thereby forming a transparent or semi-transparent electronic device mold resin body on the surface of the transparent or semi-transparent electronic device mold resin body, thereby forming a lighting mechanism.

【0008】

【発明の実施の形態】以下、本発明の実施形態を図面に基いて詳細に説明する。図1は本発明を用いたキートップ板1の要部を示す図であり、同図(a)は平面図、同図(b)は同図(a)のA-A断面図、同図(c)は裏面図である。また図2は図1(a)のB部分の拡大図である。なお図1乃至図5において合成樹脂シート10に印刷する各層の厚みは説明の都合上それぞれ実際よりかなり厚く示している。

【0009】図1に示すようにこのキートップ板1は、合成樹脂シート10の一方の面(裏面)にエレクトロルミネッセント素子層30を形成し、他方の面(表面)に印刷層及び接着層50、55を形成し、該印刷層及び接着層50、55の上を覆うようにキートップ20を成型して構成されている。なお実際は1枚の合成樹脂シート10上には上記キートップ20が多数個成型されている。以下各構成部分について詳細に説明する。

【0010】まずエレクトロルミネッセント素子層30は、図2に示すように、合成樹脂シート10の一方の面(裏面)の略全体に、透明導電膜からなる透明電極層31と、発光体層33と、絶縁層35と、背面電極層37と、絶縁保護層39とをこの順番に積層して構成されている。

【0011】ここで合成樹脂シート10としては、例えば厚み100 μ m程度の透明なポリエチレンテレフタレート製フィルムを用いる。

【0012】透明電極層31としては、例えば厚み1 μ m程度のITO膜(酸化インジウムスズ膜)を用いる。

【0013】発光体層33としては、樹脂バインダー(高誘電率樹脂、例えばシアノエチル系樹脂、ポリフッ化ビニリデン系樹脂など)中に蛍光体(例えばZnSにCuをドーブしたもの)の粉末を混合したものをい、その厚みは例えば50 μ m程度にする。

【0014】絶縁層35としては、高誘電率絶縁材、例えば高誘電率樹脂(例えばシアノエチル系樹脂、ポリフッ化ビニリデン系樹脂など)に高誘電率フィラー(例えばチタン酸バリウムの粉末)を混合したものをい。

【0015】背面電極層37としては、例えばカーボンペーストや銀ペーストを用いる。

【0016】次に合成樹脂シート10の他方の面(表面)のキートップ20を形成する部分には、所望の形状・色彩の印刷層50が形成され、その上にはキートップ20が接触する面全体に透明な塩化ビニル樹脂製の接着層55が形成されている。そして接着層55の上にキートップ20が接着されている。

【0017】図1に戻ってキートップ20は熱可塑性の透明なモールド樹脂材料からなり、その外周につば部21を設け、該つば部21の下面には合成樹脂シート10に設けた3つの貫通孔11を介して合成樹脂シート10の反対面(裏面)側に3つの固定部23を設け、これら固定部23とつば部21が合成樹脂シート10を挟持す

るようにしている。

【0018】なおこの実施形態では、固定部23とつば部21によってキートップ20を固定しているの、接着層55は必ずしも必要ない。

【0019】次に図3を用いてこのキートップ板1の製造方法を説明する。先ず図3(a)に示すように、一方の面(裏面)全体に透明電極層31を形成してなる合成樹脂シート10の該透明電極層31上に発光体層33と絶縁層35と背面電極層37と絶縁保護層39とをこの順番で印刷形成することによって、該合成樹脂シート10の一方の面全体にエレクトロルミネッセント素子層30を形成する。

【0020】次に図3(a)に示すように、合成樹脂シート10の反対側の面(表面)の所定位置に、所定形状の印刷層50を印刷し、その上に透明な接着層55を印刷する。

【0021】次に図3(b)に示すように、該合成樹脂シート10に3つの貫通孔11と、1つのピンゲート用貫通孔13をプレスによって開口する。

【0022】次に図3(c)に示すように、第1、第2金型60、70を用意する。第1金型60にはキートップ20の上部形状と同一形状のキャビティ61が設けられており、第2金型70には固定部23と同一形状の3つのキャビティ71とピンゲート73とが設けられている。

【0023】そして前記合成樹脂シート10を第1、第2金型60、70間に挟持すると、ピンゲート73は合成樹脂シート10のピンゲート用貫通孔13を貫通する。

【0024】そしてピンゲート73から溶融した樹脂を圧入してキャビティ61内を溶融樹脂で満たすと共に、貫通孔11を通してキャビティ71内にも溶融樹脂を満たす。

【0025】そして前記溶融樹脂が固化した後に第1、第2金型60、70を取り外せば、図1に示すキートップ20の成型が完了し、キートップ板1が完成する。

【0026】図4は上記キートップ板1を用いて構成した押釦スイッチの1例を示す概略側断面図である。同図に示すようにこの押釦スイッチは、キートップ板1の下側にスイッチ基板80を配置し、該スイッチ基板80に設けたスイッチ接点81上にクリック板83を取り付け、該クリック板83の上に前記キートップ20の1つの固定部23を配置するように構成している。

【0027】そしてキートップ20を押圧すれば、キートップ20が下降してその固定部23がクリック板83を反転し、スイッチ接点81をオンする。

【0028】一方前記エレクトロルミネッセント素子層30の透明電極層31と背面電極層37(図2参照)間に、例えば100Vで1KHzの交流電圧を印加すれば、発光体層33全体が発光し、その光は透明な合成樹

脂シート10及びキートップ20を通して該キートップ20の表面から放射される。このとき印刷層50に印刷された模様などがキートップ20の表面に明るく照らし出される。

【0029】エレクトロルミネッセント素子層30はキートップ20全体を均一に光らせるので、キートップ20の各部における光の強さの強弱が少なく、発光ダイオードを用いた場合のような光の偏りを全く生じない。

【0030】図5(a)、(b)はキートップ板1'、1"を用いて構成した他の押釦スイッチを示す概略側断面図である。

【0031】図5(a)に示す押釦スイッチにおいて、図4に示す押釦スイッチと相違する点は、固定部23を省略した点(キートップ20は接着層55[図2参照]によって固定されている)と、キートップ板1'とスイッチ基板80の間にラバーシート85を挿入した点と、スイッチ接点81及びクリック板83の位置をキートップ20の真下にした点のみである。

【0032】このように柔軟なラバーシート85を介在させれば、スイッチ接点81をキートップ20の中央真下に位置させてこれを押圧しても、エレクトロルミネッセント素子層3は傷まない。

【0033】なお本発明にかかるキートップ板は上記構造のものに限定されず、例えば図5(b)に示すキートップ板1"のようにキートップ20の下面中央に合成樹脂シート10を貫通して挟持する固定部23を設けても良い等、種々の変形が可能である。

【0034】さらに本発明はキートップ板1に適用されるのみならず、例えば回転式電子部品のつまみの部分や、スライド式可変抵抗器のつまみの部分など、他の種々の電子機器用モールド樹脂体の照光にも適用できる。

【0035】

【発明の効果】以上詳細に説明したように本発明によれば以下のような優れた効果を有する。

①エレクトロルミネッセント素子層を用いているので光源を平面状にすることができ、別途拡散部材などを用いなくても容易にキートップの表面全体を均一に照光することができる。

【0036】②光源が平面状で且つ薄いので、装置の薄型化が図れる。

【0037】③1枚の合成樹脂シート全体にエレクトロルミネッセント素子層を一度に形成することにより多数個のモールド樹脂体を照光できるので、従来のように発光ダイオードを多数個取り付けの必要がなく、構造が簡単で部品点数が削減でき、組み立てが容易である。

【0038】④発光ダイオードを用いたものに比べ、消費電力が少ない(約半分)。特に電池を利用した携帯機器に応用した場合は連続使用時間の延長に効果的である。

【図面の簡単な説明】

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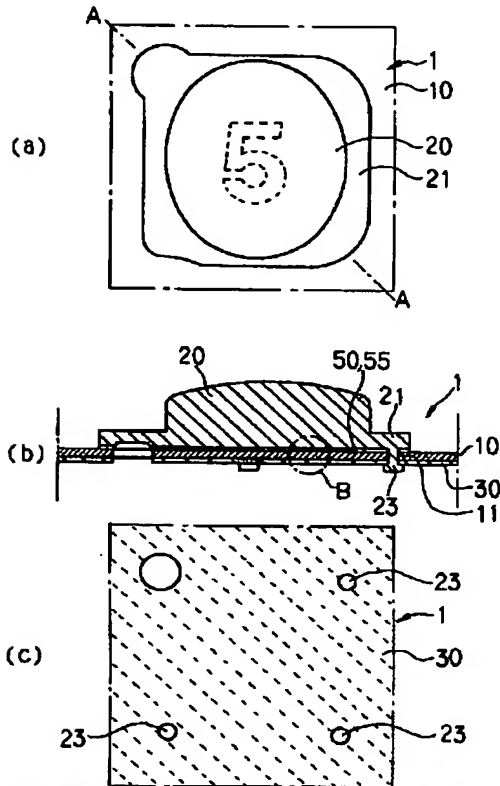
【図1】本発明を用いたキートップ板1の要部を示す図であり、同図(a)は平面図、同図(b)は同図(a)のA-A断面図、同図(c)は裏面図である。

【図2】図1(a)のB部分の拡大図である。

【図3】キートップ板1の製造方法を示す図である。

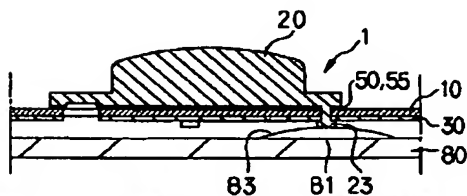
【図4】キートップ板1を用いた押釦スイッチの1例を示す概略側断面図である。

【図1】



本発明を用いたキートップ板1の要部を示す図

【図4】



キートップ板1を用いた押釦スイッチを示す図

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【図5】図5(a), (b)はキートップ板1, 1'を用いた他の押釦スイッチを示す概略側断面図である。

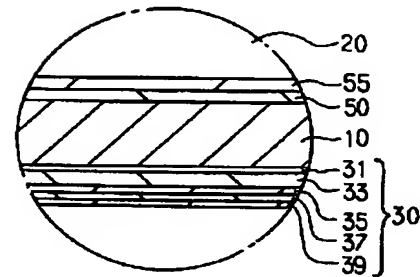
【符号の説明】

10 合成樹脂シート

20 キートップ (電子機器用モールド樹脂体)

30 エレクトロルミネッセント素子層

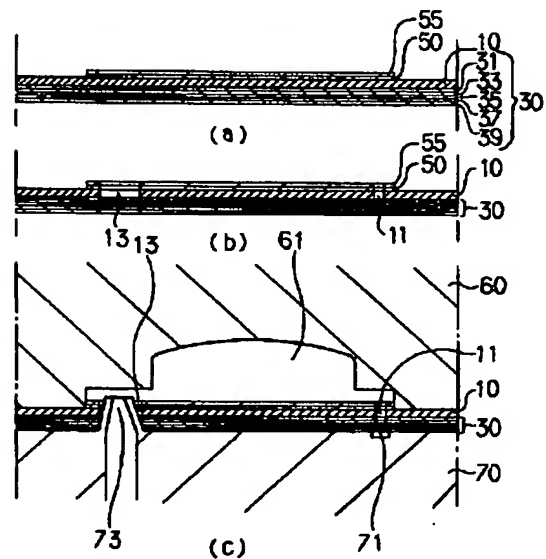
【図2】



10 合成樹脂シート、20 キートップ
30 エレクトロルミネッセント素子層

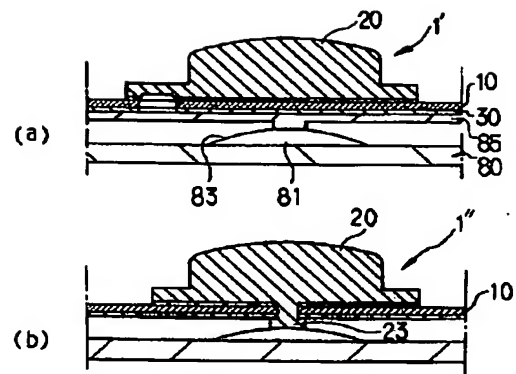
図1(a)のB部分の拡大図

【図3】



キートップ板1の製造方法を示す図

【図5】



キートップ板1を用いた押釦スイッチを示す図